BASIS FOR AMENDMENTS

Claims 3, 4, 10, 11, 12, 15 and 16 have been canceled.

Claims 3 and 17 have been amended as supported by the claims and specification as originally filed.

No new matter is believed to have been added to the present application by the amendments submitted above.

Claims 1, 2, 7-9, 17-19 are pending. Claims 1, 2 and 7-9 are withdrawn from consideration as being drawn to non-elected subject matter.

REMARKS/ARGUMENTS

Applicants wish to thank Examiner Mesh and Supervisory Examiner David Buttner for the helpful discussion on March 19, 2008. The claims as amended and the arguments presented below were discussed. The Examiners pointed out that a biaxially stretched film with negative birefringence is disclosed at col. 2, lines 49-52 of Arakawa (US 5,213,852). However, this film is a polystyrene or polyacrylate film and **not** a film based on components a) and b) as claimed in Claim 17 of the present invention having the claimed relationship of the three dimensional refractive indexes. Further, the polystyrene or polyacrylate film of Arakawa has problems and thus the reference teaches away from using such film. See col. 2, line 53 to col. 3, line 5 of Arakawa:

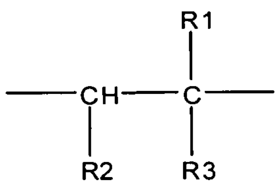
> The above techniques using the phase difference film having a negative intrinsic birefringence are reasonable for enhancement of viewing angle characteristics. **However, the film having a negative intrinsic birefringence is not satisfactory in productivity, yield and stability of retardation value during storage at high temperatures.** In more detail, it is generally needed that the material (polymer) of the phase difference film satisfies the characteristics such as transparency, easiness of occurrence of birefringence by stretching, and sufficient flexibility and heat resistance so as not to damage the film in the procedures for its production such as film formation, stretching, transportation and winding.
>
> **Studies of the present inventors have revealed that among known phase difference films having a negative intrinsic birefringence a polystyrene film only has practical value in easiness of occurrence of birefringence. However, a phase difference film made of the polystyrene dose not exhibit a satisfactory heat-resistance and a good flexibility, so that the film is apt to be damaged in the process for the preparation.**
>
> Emphasis added.

The rejection of Claims 3-4, 10-12 and 15-19 under 35 U.S.C. § 103(a) over JP 05-117334 and Arakawa et al is traversed.

Claim 17 of the present invention relates to an **optical film exhibiting <u>negative</u> birefringence**, which comprises:

a resin composition, which comprises:

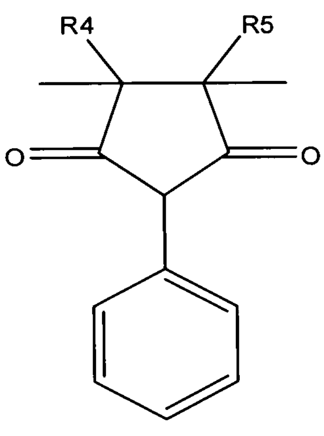
(a) 30-95% by weight of a copolymer comprising an a-olefin residual group unit represented by the following formula (i):



(i)

wherein R1, R2 and R3 each independently represent hydrogen or an alkyl group having 1-6 carbon atoms, and

an N-phenyl-substituted maleimide residual group unit represented by the following formula (ii):



(ii)

wherein R4 and R5 each independently represent hydrogen, or a linear or branched alkyl group having 1-8 carbon atoms; and

having a weight average molecular weight, as reduced into standard polystyrene, of 5×10^3 to 5×10^6; and

(b) 70-5% by weight of at least one acrylonitrile-styrene based copolymer selected from an acrylonitrile-styrene copolymer and an acrylonitrile-butadiene-styrene

copolymer, a weight ratio of an acrylonitrile residual group unit to a styrene residual group unit being 20/80 to 35/65, and having a weight average molecular weight, as reduced into standard polystyrene, of 5×10^3 to 5×10^6,

the optical film being obtained by biaxially stretching the resin composition,

the optical film having a relationship of three-dimensional refractive indexes of nz>ny≥nx or nz>nx≥ny in the case where the stretching direction is define as an x-axis and a y-axis within a film plane, a direction outside the film plane and perpendicular to the x-axis and y-axis is defined as a z-axis, a refractive index in the x axis direction is defined as nx, a refractive index in the y-axis direction is defined as ny, and a refractive index in the z-axis direction is defined as nz.

In the present invention, negative birefringence and the relationship of three-dimensional refractive indexes, are achieved by combination of the specific olefin-N-phenylmaleimide copolymer and acrylonitrile-styrene copolymer and also by subjecting the resin composition to biaxially stretching. Further, the specification of the present application discloses that, when the same resin materials are subjected to each of a uniaxial stretching and a biaxial stretching, the resulting relationship of three-dimensional refractive indexes is different. See for example page 16, last paragraph to page 17, second paragraph.

The negative birefringence of the optical film of the present application is developed by combining the specified olefin-N-phenylmaleimide copolymer and the acrylonitrile-styrene copolymer. However, this is not a function inherent to the substance itself but a secondary function developed by an alignment of the polymer chains. Also the relationship of the three-dimensional refractive indexes is a parameter controllable by the alignment condition of the polymer chain (for example stretching condition), and is also a parameter

determining the characteristics as the optical film. Therefore, in the present invention, different relationships of the three-dimensional refractive indexes are defined respectively for the uniaxial stretching and the bi-axial stretching.

Further, one cannot easily switch between positive and negative birefringence depending on how stretching occurs. According to the discussion at pages 1 and 2 of the specification this is not possible since negative birefringence films have not been available so far.

In this context, the specification states at pages 1 and 2 that hitherto, stretching and orientation of films have been carried out as a method of revealing optical anisotropy (positive or negative birefringence) of transparent resin materials. It is known that according to the stretching and orientation, films made of polymethyl methacrylate (PMMA) or polystyrene (PS) exhibit negative birefringence, whereas films made of a polycarbonate (PC) or an amorphous cyclic polyolefin (APO) exhibit positive birefringence.

However, PMMA and PS were limited with respect to applications because they have a glass transition temperature (hereinafter referred to as "Tg") in the vicinity of 100°C so that the heat resistance is insufficient, and are brittle. On the other hand, although PC and APO have a Tg of around 140°C so that they are excellent in heat resistance and dynamic characteristic, they are a material exhibiting positive birefringence but not a material exhibiting negative birefringence, which exhibits transparent and heat resistance and is dynamically excellent. Accordingly, it is the present state that optical films are wholly produced using a resin material exhibiting positive birefringence and that heat resistant optical films exhibiting negative birefringence are not available yet.

In summary, because the positive or negative birefringence of the films is a function of the orientation of the molecular chains and is developed by stretching the resins, one

cannot easily switch between negative and positive birefringence simply by controlling the stretching. The actual molecular structure that is stretched also contributes. Similarly, obtaining a specific relation of the three-dimensional refractive indices is not a simple matter. A specific film having specific molecules gives a specific relationship of three-dimensional refractive indices when stretched.

Also blending of different materials does not simply result in a material having negative birefringence and the claimed three-dimensional relationship of the refractive indices.

JP 05-117334 and Arakawa et al fail to disclose or suggest an optical film exhibiting **negative birefringence** as claimed comprising components a) and b) in the claimed amounts and the claimed relation among the three-dimensional refractive indexes.

In addition, JP 05-117334 and Arakawa et al fail to disclose or suggest the superior properties obtained with the claimed film.

JP-05-117334 discloses an **olefin/ N-phenyl substituted maleimide/ N-alkyl substituted maleimide copolymer** and an optical material comprising the copolymer. The optical material exhibits **low** birefringence (JP 05-117334, abstract). However, **low** birefringence is **different from negative** birefringence. Such optical materials cannot be used as optical films which positively make use of birefringence represented by a retardation film because of their characteristic low birefringence. In paragraph [0030], there is a description that other resins which are miscible therewith may be mixed if necessary.

The optical material of JP 05-117334 exhibits a low birefringence and, therefore, it is unable to be used as an optical film where the birefringence represented by a retardation film is positively utilized. In the examples of the optical material mentioned in the paragraphs

[0034] to [0035], there is no description for optical film and retardation film where the birefringence is positively utilized.

Further, in JP 05-117334, there is no disclosure or suggestion of biaxial stretching of an optical material or carrying out a stretching processing.

The optical material mentioned in JP 05-117334 is intended to achieve the characteristic of low birefringence (zero birefringence). On the other hand, the optical film of the present invention exhibits negative birefringence. Low birefringence and negative birefringence however are achieved by very different techniques.

The low birefringence and the negative birefringence are completely different optical characteristics. JP-05-117334 describes blending or copolymerizing a material having a positive birefringence and a material having a negative birefringence **to cancel the birefringence** [paragraphs 0022 and 0026] thereby obtaining a material of a low birefringence. There is no disclosure of obtaining a material having negative birefringence. JP 05-117334 aims at providing a material of a low birefringence and is **fundamentally contradictory to the invention of present application**.

In addition, although the resin of Example 2 exhibits a very low negative birefringence, it is a resin which does not have the claimed components (a) and (b) of the present invention. Thus, a person of ordinary skill in the art could not have predicted that a film containing components a) and b) as claimed, exhibits a negative birefringence. As stated above, the birefringence depends on many parameters and there is no expectation of success when using different materials.

Arakawa et al disclose only the use of styrene/acrylonitrile copolymer and fail to disclose the use of component a). Arakawa et al disclose that a uniaxially stretched film of a styrene-acrylonitrile copolymer exhibits negative birefringence. Arakawa et al neither dicloses nor suggests blending an olefin-N-phenylmaleimide copolymer with a styrene-acrylonitrile copolymer or the biaxial stretching as claimed in Claim 17.

In addition, the optical film having negative birefringence, and satisfying the relation among the three-dimensional refractive indexes of $nz>ny\geq nx$ or $nz>nx\geq ny$ according to the invention of the present application is neither described nor suggested at all in Arakawa et al.

The relation of the three-dimensional birefringence as set forth in column 5, lines 40 to 60 of Arakawa et al relates to **positive birefringence**.

Arakawa et al merely disclose a film which has a negative birefringence but is inferior in the thermal resistance, as described in Comparative Example 3 of the specification of the present application which has **only component b)** (acrylonitrile-styrene copolymer in Comparative Example 3). **The resulting films have cracks and are brittle or have inferior heat resistance.**

In US 4605700, there is a description for a composition comprising an N-substituted phenyl-maleimide-olefin copolymer and an acrylonitrile-styrene copolymer and it is mentioned that said composition exhibits miscibility. However, in US 4605700, there is just a description for said composition exhibiting miscibility and there is no disclosure or suggestion of an optical film or an optical film exhibiting the specific relationship for three-dimensional refractive indexes due to a biaxial stretching and exhibiting negative birefringence.

Since the optical film of the invention of the present application comprises specific olefin-N-phenylmaleimide copolymer and acrylonitrile-styrene copolymer, said film is excellent in its heat resistance and dynamic characteristic.

Further, when the optical film of the invention of the present application is subjected to a biaxial stretching, it exhibits a specific relationship in its three-dimensional refractive indexes.

The Examiner has taken the position that it would have been obvious to combine JP 05-117334 and Arakawa et al. However, as mentioned already, JP 05-117334 provides a material exhibiting a low birefringence and its object is to eliminate the birefringence. On the other hand, an object of Arakawa et al is that the birefringence is expressed and positively utilized the same as in the invention of the present application. Thus, it is not obvious even for persons skilled in the art to combine the characteristics as such which are contrary each other. Further, Arakawa et al relates to a film prepared by a uniaxial stretching while the characteristic feature of the invention of the present application is a biaxial stretching. Furthermore, the problems of both brittleness and low heat resistance are simultaneously solved by the invention of the present application.

The optical film of the invention of the present application, does not have cracks, is not brittle and exhibits excellent heat resistance. For example the specification discloses at page 18, lines 19-24:

> "The resin composition for optical film according to the present invention is a resin composition having excellent heat resistance and dynamic characteristics and having excellent characteristics as a composition for optical films exhibiting negative birefringence, and an optical film comprising the same is excellent in heat resistance

and dynamic characteristics and can be suitably used for optical films required to have negative birefringence."

The Examiner is reminded that even if there was a prima facie case (which there is not as stated above), unexpected results can be used to rebut such prima facie case. Accordingly, optical films of the present invention having the claimed combination of components a) and b) in the claimed amounts do not exhibit fine cracks and can therefore be used as retardation films. See Examples 1-5 at pages 20 -25 of the specification. These superior properties are not disclosed or suggested by JP 05-117334, Arakawa et al, US 4605700, alone or in **combination**. Thus, even a **combination** of JP 05-117334, Arakawa et al, US 4605700, does **not** render the present invention obvious.

In contrast, Comparative Examples 1-3 use **only component a)** (N-phenylmaleimide-isobutene copolymer and N-(2-methylphenyl)maleimide-isobutene copolymer, respectively in Comparative Examples 1 and 2) **or only component b)** (acrylonitrile-styrene copolymer in Comparative Example 3). **The resulting film have cracks and are brittle or have inferior heat resistance.** See pages 25-28 of the specification. Thus, any prima facie case has been rebutted.

Further, Applicants disagree with the Examiner's representation of what is disclosed in paragraphs [004 and 005] of the specification. Contrary to the Examiner's statements, these paragraphs relate to **background art** and describe the **drawbacks** of using PMMA and PS which have **insufficient heat resistance and are brittle** or of APO which exhibits **positive** birefiringence. **There is no disclosure or suggestion of the combination of components a) and b) as claimed in the claimed amounts to produce an optical film having negative birefringence or the claimed relation among the three-dimensional refractive indexes.**

Therefore, rejection of Claims 3-4, 10-12 and 15-19 under 35 U.S.C. § 103(a) over JP 05-117334 and Arakawa et al are believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of this rejection is respectfully requested.

Applicants submit that the present application is in condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

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